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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/809,766	03/15/2001	Juan Ferrera	FIS920000237US1	4985

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EXAMINER

GURZO, PAUL M

ART UNIT	PAPER NUMBER
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2881

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/809,766

Applicant(s)

FERRERA ET AL.

Examiner

Paul Gurzo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-8, and 19-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aizaki (5,932,884), and further in view of Utsumi (5,831,272).

Regarding claims 1 and 20, 884 teaches a charged particle beam lithography tool and a method of operating such a tool including a source of a beam (51), a means for causing a shadow pattern with the charged particle beam (50), a means for shaping the beam (54a and 54b), a means for deflecting the beam to a desired location (55), and a means for generating a correction (col. 1, lines 7-14, col. 3, line 43 - col. 4, line 9, col. 5, lines 8-32, and Fig. 2). 884 teaches deflected scanning of the beam on the mask (53), it is known in the art of beam lithography that such a scanning is known as dithering, but it is not explicitly stated. In addition, 272 teaches that an electron beam is deflected in relation to a mask by a raster scan (col. 3, lines 38-40). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to raster scan because it will lead to an efficient pattern transfer as is desired by both the applied prior art.

Regarding claims 2-4 and 19, 884 teaches a first and second shaping apertures (54a and 54b) that will deflect and pass in the desired manner and Fig. 2 clearly depicts the claimed order of operation.

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Regarding claim 6, it is well known in the art that dithering is performed by moving a pattern in a repeated pattern having a repetition time.

Regarding claim 7, it is well known in the art that the repetition time is similar to the spot exposure time.

Regarding claim 8, 272 teaches raster scanning as applied above.

Claims 5, 11-13, and 16-18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aizaki (5,932,884), in view of Utsumi (5,831,272), and further in view of Goodberlet et al. ("Extending Spatial-Phase-Locked Electron-Based Lithography to two Dimensions", Applied Physics, December 1997, pages 7557-7559).

Regarding claim 5, the above applied prior art does not teach the use of fiducial marks of a scintillating material to detect this output of light. However, Goodberlet et al. teach the use of a fiducial grid as well as fabricating this grid from scintillating material. They also teach the claimed optical detection (page 7559, Section 4, paragraph 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include fiducial marks of a scintillating material because a scintillator can yield near infinite values of contrast.

Regarding claim 11, it is well known in the art that dithering is performed by moving a pattern in a repeated pattern having a repetition time.

Regarding claim 12, it is well known in the art that the repetition time is similar to the spot exposure time.

Regarding claim 13, 272 teaches raster scanning as applied above.

Regarding claim 16, 884 teaches a charged particle beam lithography tool and a method of operating such a tool including a source of a beam (51), a means for causing a shadow pattern

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with the charged particle beam (50), a means for shaping the beam (54a and 54b), a means for deflecting the beam to a desired location (55), and a means for generating a correction (col. 1, lines 7-14, col. 3, line 43 - col. 4, line 9, col. 5, lines 8-32, and Fig. 2). 884 teaches deflected scanning of the beam on the mask (53). It is well known in the art to use fiducial marks as Goodberlet et al. teach in their design. Further, it is known that fiducial marks are used on the target and it is inherent to the design of prior art that their detection will detect the claimed shadow pattern that is incident on the fiducial marks.

Regarding claim 17, Goodberlet et al. teach the use of scintillating material as applied above.

Regarding claim 18, it is an obvious matter of design choice to align the fiducial marks on the target so that they correspond to the shadow pattern because that will ensure that the beam is properly detected and it will be easier to generate a correction means when the most accurate beam placement is known.

Claims 9 and 10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aizaki (5,932,884), in view of Utsumi (5,831,272), and further in view of Sakamoto et al. (5,051,556).

The above-applied prior art does not teach an angled shape that is retraced with an offset. However, Sakamoto et al. teach that the beam is offset from the optical axis, and the path can be adjusted by decomposing the offset of the electron beam into an angular offset component ϕ representing a deviation of the beam direction from vertical and further into a lateral offset component δ representing a lateral deviation of the beam from the properly aligned beam path, and further by changing these offset components ϕ and δ independently (col. 11, lines 29-46).

Claims 14 and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aizaki (5,932,884), in view of Utsumi (5,831,272), in view of Goodberlet et al. ("Extending Spatial-Phase-Locked Electron-Based Lithography to two Dimensions", Applied Physics, December 1997, pages 7557-7559), and further in view of Sakamoto et al. (5,051,556).

The above-applied prior art does not teach an angled shape that is retraced with an offset. However, Sakamoto et al. teach that the beam is offset from the optical axis, and the path can be adjusted by decomposing the offset of the electron beam into an angular offset component ϕ representing a deviation of the beam direction from vertical and further into a lateral offset component δ representing a lateral deviation of the beam from the properly aligned beam path, and further by changing these offset components ϕ and δ independently (col. 11, lines 29-46).

Response to Arguments

Applicant's arguments filed July 23, 2003 have been fully considered but they are not persuasive. Applicant argues that the prior art has nothing to do with detection and correction of beam position, does not teach a shadow pattern, does not teach dithering, and impermissible hindsight has been used.

Regarding the argument that the prior art does not deal with detection and correction of beam position, 884 explicitly teaches current density correction data and exposure time calculation through the detection of the current density of the electron beam for any selected apertures on an aperture mask (col. 10, lines 46-56).

Regarding the argument that there is no teaching of a shadow pattern, Examiner cites page 12, line 28 - page 13, line 9. Interpreting this, it is understood that a shadow pattern is

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caused by a probe mesh intercepting a portion of the beam current. Referring to 884 Fig. 2, a probe mesh (66 and 66a) intercepts a portion of a beam current (50). This is substantially equivalent to the claimed way to cause a shadow pattern, therefore, a shadow pattern is, in fact, formed.

Regarding the argument that dithering is not taught, Examiner cites page 13, lines 10-14. Interpreting this, it is understood that dithering is the repetitive movement of the beam at high speed. Using this definition, the scanning taught by 884 and the raster scanning taught by 272 are dithering because there is repetitive movement of the beam at high speed.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul Gurzo whose telephone number is (703) 306-0532. The examiner can normally be reached on M-Thurs. 7:30 - 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Lee can be reached on (703) 308-4116. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

PMG
October 15, 2003


JOHN R. LEE
SUPERVISORY/PATENT EXAMINER
TECHNOLOGY CENTER 2800